LAKE PLEASANT

Steuben County

2006 Fish Management Report

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EXECUTIVE SUMMARY

- A general lake survey was conducted on Lake Pleasant on June 12 through 16, 2006. Water chemistry and aquatic vegetation data were also collected.

- The Secchi disk reading at Lake Pleasant was 19 ft and dissolved oxygen concentrations were adequate for fish survival to a depth of 33 ft. Submersed vegetation was found to a maximum depth of 18 ft. Chara dominated the plant population, but spiny naiad, slender naiad, Illinois pondweed, variable pondweed and bladderwort were found frequently throughout the lake.

- A total of 1,454 fish representing 21 species were collected during this survey. Bluegill ranked first by number, followed by redear, largemouth bass and northern pike. Northern pike was the dominant species collected by weight followed by redear, largemouth bass and bluegill.

- Age-1 bluegill and largemouth bass grew at an average rate for northern Indiana natural lakes, but in older fish growth declined to below average. Despite the decline in growth, both species are present in adequate numbers and size to attract anglers.

- Redear numbers appear to be increasing at Lake Pleasant however growth has declined from above average to average. The percentage of harvestable size fish in the survey sample was outstanding at just over 93%.

- The northern pike population at Lake Pleasant has exploded, as evidenced by the collection of 61 fish during this survey compared to 12 in 1982 and 10 in 1965. Approximately 75% of the pike collected were legal size (20 in TL or larger) with the largest measuring 33.5 in TL.

- The Lake Pleasant Property Owners Association should consider the construction and placement of brush pile fish attractors in their lake. If interested, they should contact the local district fisheries biologist in order to obtain the proper permit applications and technical assistance with the project.

- The control of Eurasian watermilfoil should be aggressively pursued in order to keep this noxious weed from becoming established and spreading throughout the lake. Additional funding through the LARE program should be sought in addressing this control.

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INTRODUCTION

Lake Pleasant is a 424-acre natural lake located approximately four miles northeast of Orland, Indiana in Steuben County. A small northwest portion of the lake lies in Branch County, Michigan. It has an average depth of 8 feet and a maximum depth of 52 feet. There is one inlet for Lake Pleasant, an unnamed intermittent flowing ditch that enters the lake in the northeast corner and originates from drainage. The outlet, also unnamed, is located on the north shore of Lake Pleasant in Michigan and drains into the Prairie River which is a tributary of the St. Joseph River. There is no state owned access site located on Lake Pleasant. There are two places where anglers can launch their boat for a fee. One is a marina located on the south shore of the lake toward the west end. The other is a camp ground also located on the south shore but more towards the center of the lake. Both locations have a concrete boat ramp. Homes occupy roughly 50% of the shoreline with approximately 5% bordering a campground. The remainder is a mixture of wetlands, wooded areas and some agricultural land.

Lake Pleasant was hydrographically surveyed in 1960. The initial fisheries survey by Indiana Department of Natural Resources, Division of Fish and Wildlife (DFW) biologists was conducted in 1965. The purpose of this survey was to evaluate the quality of the sport fishery. The major sport fish collected during this survey were bluegill, redear, largemouth bass and yellow perch (Table 1). A second fisheries survey was conducted in 1982. This survey found that the fishery was improving, as evidenced by the increasing numbers of harvestable size fish of various species available. A special note was made in regards to the quality redear the lake was producing. The current survey was conducted to evaluate fish population changes since the 1982 survey.

METHODS

This survey was conducted on June 12 through 16, 2006 as part of DFW Work Plan 204755 that covers management of fish populations in natural lakes. Several physical and chemical characteristics of the water were measured in the deepest area of the lake according to the Manual of Fisheries Survey Methods (2001) standard lake survey guidelines. Submersed aquatic vegetation was sampled on August 15, 2006 using methods outlined in the Tier II Aquatic Vegetation Survey Protocol developed by the DFW Lake and River Enhancement Program and used in their aquatic vegetation control grant program. A global positioning system

(GPS) device was used to record the location of the limnological data collection site, aquatic vegetation sample sites, and fish collection sites.

Fish were collected by pulsed D.C. electrofishing the shoreline at night with two dippers for 1.25 hours. Two trap nets and three experimental-mesh gill nets were fished overnight for four nights. All fish collected were measured to the nearest 0.1 in TL. Length-weight regression equations for Fish Management District 2 were used to estimate the weight of all fish within the sample. Five scale samples per half-inch group were collected from game species for age and growth analysis. Average length-at-age for these species was estimated using the Fraser-Lee method of back calculation and standard intercepts (DeVries and Frie 1996, Carlander 1982).

RESULTS

The Secchi disk reading at Lake Pleasant was 19 ft and dissolved oxygen concentrations were adequate for fish survival up to a depth of 33 ft. Eighty sites were randomly sampled during the plant survey, 77 of which fell within the littoral zone in water 18 ft in depth or less. A total of 14 native and 1 exotic species were identified. Aquatic plants were observed at 72 of the 77 littoral sites sampled. The maximum number of plant species found at one site was six and the mean was two. Chara was the dominant plant collected followed by slender naiad and spiny naiad. Seven emergent, floating or floating leaf plants associated with wetlands, arrowhead, cattails, pickerelweed, hardstem bulrush, purple loosestrife, spatterdock and white water lily, were also observed. The bulrush in particular is very abundant compared to other northern Indiana natural lakes.

A total of 1,454 fish representing 21 species were collected from Lake Pleasant in 2006. Bluegill was the top species collected by number (47%) followed by redear (24%), largemouth bass (6%) and northern pike (4%). Northern pike was the dominant species collected by weight (29%) followed by redear (22%), bluegill (12%) and largemouth bass (12%).

Bluegill ranked first numerically (47%) and third by weight (12%) among species collected during the survey. The 678 bluegills collected ranged in length from 1.8 (age 1) to 8.6 (age 8) in TL and averaged 4.9 in TL. They weighed approximately 65 pounds. During electrofishing bluegills were collected at a rate of 406 fish per hour. Gill netting yielded 2.3 bluegills per lift and trap netting 24 bluegills per lift. Bluegill 6.0-in TL or larger, considered harvestable size, comprised 27% of the sample, reaching this size during their fifth, sixth or

seventh year of life. Age-1 bluegill grew at an average rate for northern Indiana natural lakes while all ages of older bluegill grew at a below average rate. A total of 419 bluegills were collected during the previous survey in 1982. Harvestable size bluegill comprised 34% of that sample. Bluegill in 1982 grew at an average rate for northern Indiana natural lakes. In 1965 only 30 of the 301 bluegills collected were harvestable size (10%).

A total of 351 redear weighing approximately 150 pounds were collected. Redear ranked second both numerically and by weight, comprising 24% and 22% of the sample respectively. They ranged in length from 3.7 (age 2) to 11.3 (age 6) in TL and averaged 7.7 in TL. Redear grew at an average rate for northern Indiana natural lakes. Harvestable size redear (6 in TL or larger) comprised 93% of the sample, reaching this size during their third or fourth year of life. In addition, 57% were 8 in TL or larger and 17% were 9 in TL or larger. During electrofishing redear were collected at a rate of 34 fish per hour. Gill netting yielded 0.5 redear per lift and trap netting 51 redear per lift. A total of 221 redear were collected in 1982 and 180 in 1965. Harvestable size redear comprised 96% and 37% of these samples respectively.

Eighty-seven largemouth bass were collected during the survey, ranking third numerically (6%) and fourth by weight (12%). They ranged in length from 3.3 (age 1) to 18.4 (age 8) in TL and averaged 10.4 in TL. Bass measuring 14 in TL or larger (legal size) comprised 18% of the sample, reaching this size during their sixth or seventh year of life. Approximately 9% of the bass collected measured 16 in TL or larger and three bass were 18-in TL or larger. Age-1 bass grew at an average rate for northern Indiana natural lakes while older fish exhibited below average growth. Electrofishing resulted in the capture of 71% of the total number of bass in the sample at a rate of 50 bass per hour. Less than two bass per lift were collected during gill netting and trap netting. Only 9% of the 53 bass collected in 1982 were 14 in TL or larger. Three of those fish were 18 in TL or larger, the same number as in the current survey.

Northern pike was the top species collected by weight with 93 pounds in the sample. They ranged in length from 14.1 (age 1) to 33.5 (age 7) in TL and averaged 22.2 in TL. Legal size pike, those 20 in TL or larger, comprised 75% of the sample. Three of the pike collected were 30 in TL or larger. Northern pike growth in northern Indiana lakes is extremely variable but even taking this into account it appears pike at Lake Pleasant are growing at a below average rate. All of the pike were captured using gill nets. There were only 22 pike total collected during the previous two surveys.

A total of 42 yellow perch weighing 4.5 pounds were captured during this survey. They ranged in length from 4.6 (age 2) to 8.4 (age 3) in TL and averaged 6.1 in TL. Only three of these perch were harvestable size (8 in TL or larger). Perch grew at an average rate for northern Indiana natural lakes. In 1982 there were 77 perch collected and 31% of these were harvestable size. Only 8% of the 51 perch captured in 1965 were harvestable size.

Other sport species of interest collected during this survey included 23 black crappie, the largest of which measured 12 in TL, 17 rock bass and one 15.2-in TL smallmouth bass.

DISCUSSION

Lake Pleasant supports a diverse sport fish population dominated by bluegill, redear and largemouth bass. Together, these three species comprised 77% of the survey sample by number and 46% by weight. In addition to these three species, northern pike, yellow perch and black crappie provide angling opportunities.

Bluegill was the dominant species collected numerically comprising 47% of the sample. They were present in lengths up to 8.6 in TL, and the population is comprised of a reasonable number of harvestable size fish (27%). Further examination reveals average growth of all bluegill older than age 1 has fallen to below average. Many bluegills at Lake Pleasant do not reach 6 in TL until age 7. Bluegills in northern Indiana natural lakes typically reach that size by age 5. A massive overlap of bluegill of age 5, 6 and 7 currently occurs between the lengths of 6 in TL and 8 in TL. In addition, age-3 bluegill were found to be anywhere from 3 in TL to 5 in TL. Competition between these year classes is obviously causing stunting of bluegill growth. It is somewhat encouraging that despite this slow growth larger size individuals are still present within the population. Many lakes with severe stunting problems rarely produce bluegill 8 in TL or larger. Bluegills are present in an adequate number and size to attract anglers.

Redear numbers appear to be increasing at Lake Pleasant, however growth has declined from above average to average. The percentage of harvestable size fish in the population continues to be outstanding at just over 93%, which is comparable to the 1982 level. Redear maintain a considerable presence within the fishery of Lake Pleasant as they were second by both number and weight among species collected. In terms of size they are probably the most desirable species for anglers, with 57% measuring 8 in TL or larger and fish as large as 11.3 in TL collected.

Like bluegill, age-1 largemouth bass grew at an average rate for northern Indiana natural lakes, but in older fish growth declined to below average. The largest size overlap in bass occurred for age-3 and age-4 fish. Age-3 bass ranged from 6.5 to 12.0 in TL while age-4 fish ranged from 7.5 to 12.0 in TL. Bass reached legal size in Lake Pleasant one to two years later on average than in other Indiana natural lakes. Despite the fact bass growth rates declined since the last survey, a higher percentage of harvestable size bass was collected. In fact, the percentage of bass 16 in TL or larger collected this year matched the percentage of fish 14 in TL or larger collected in 1982 (9%). An identical number of bass 18 in TL or larger (3) were collected in each survey. Bass growth has declined but they still exist in numbers and sizes sufficient to satisfy anglers.

The northern pike population at Lake Pleasant has exploded, as evidenced by the collection of 61 fish during this survey compared to 12 in 1982 and 10 in 1965. The large majority of the pike (95%) were less than 30 in TL and year classes were spread out extensively over various sizes, especially age-2 fish which ranged from 17 to 23 in TL. Approximately 75% of the pike collected were legal size (20 in TL or larger) with the largest measuring 33.5 in TL. Northern pike offer good additional fishing opportunities at Lake Pleasant.

Yellow perch and black crappie were collected in small numbers and were highlighted by a 12-in TL crappie. One smallmouth bass measuring 15.2 in TL was also collected during the survey. These species, although not present in large numbers, present Lake Pleasant anglers with other fishing options.

Aquatic vegetation abundance at Lake Pleasant is low although the lake supports a very diverse plant population. The lake has very large quantities of bulrush present, a species that has declined in Indiana natural lakes over the years. One exotic nuisance species, Eurasian watermilfoil, has been found in the lake but has been successfully controlled through herbicide applications. Some milfoil was observed during fish sampling in June, but following chemical treatments none was collected during the August plant sampling. These chemical treatments were paid for in part through a cost share program available through the DFW's Lake and River Enhancement program (LARE).

The littoral zone of a lake is generally very productive when the proper habitat exists for fish. However the littoral zone of Lake Pleasant consists of shallow, sparsely vegetated sandy flats which lack the structure necessary to provide desirable fish habitat. This general lack of

structure in Lake Pleasant often times leads to frustration as fisherman seek to locate fish. Brush pile fish attractors have proven to be very beneficial in lakes lacking structure and would be a good addition to Lake Pleasant. Following the 1982 survey, a recommendation was made for the construction of two fish attractors with the assistance of the DFW but biologists were never approached by the property owners in regards to placement of these structures in the lake. Construction of these fish attractors remains a viable alternative for improving fishing in Lake Pleasant.

The water quality at Lake Pleasant is considered good. The 19 ft secchi disk reading obtained during June was similar to the 20 ft reading recorded in 1982 and is very good for northern Indiana natural lakes. No fish diseases or parasites were observed during the survey. Shoreline erosion was minimal.

RECOMMENDATIONS

- The Lake Pleasant Property Owners Association should consider the construction and placement of brush pile fish attractors in their lake. If interested, they should contact the local district fisheries biologist in order to obtain the proper permit applications and technical assistance with the project.

- The control of Eurasian watermilfoil should be aggressively pursued in order to keep this noxious weed from becoming established and spreading throughout the lake. Additional assistance through the LARE program should be sought in addressing this control.

LITERATURE CITED

Carlander, KD. 1982. Standard intercepts for calculating length from scale measurements for some centrarchid and percid fishes. Transactions of the American Fisheries Society 111:332-336.

DeVries, DR and RV Frie. 1996. Determination of Age and Growth. Pages 483-512 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Submitted by: Larry A. Koza, Assistant Fisheries Biologist
Date: 2/26/2007

Approved by: Stuart Shipman
North Region Fisheries Supervisor
Date: 2/26/2007

Table 1. Sampling effort, species composition and relative abundance of fish collected during 1965, 1982 and 2006 fisheries surveys of Lake Pleasant.

Species	1965	1982	2006
Black bullhead		1	
Black crappie	4	15	23
Bluegill	301	419	678
Bowfin		20	8
Brook silverside	Common	Common	Common
Brown bullhead	1	21	20
Golden shiner		1	3
Grass pickerel		3	5
Green sunfish	3	1	2
Hybrid sunfish			15
Lake chubsucker		6	2
Largemouth bass	65	53	87
Longnose gar	3	1	8
Northern pike	10	12	61
Pumpkinseed	8	39	26
Redear	180	221	351
Rock bass	2	37	17
Shortnose gar	1		
Smallmouth bass	3		1
Spotted gar	4	9	4
Warmouth	22	138	48
White sucker	12		
Yellow bullhead	11	358	53
Yellow perch	51	77	42
Total	681	1,447	1,454
Sampling Effort			
Electrofishing Effort	3.5 h AC	2.0 h DC	1.25 h DC
Gill Net Effort	20 lifts	16 lifts	12 lifts
Trap Net Effort	80 lifts*	16 lifts	8 lifts

*Wire traps

Table 2. Relative abundance by select size ranges for bluegill, largemouth bass and redear collected during 1965, 1982 and 2006 fisheries surveys of Lake Pleasant.

Species	Length Range (TL)	1965	1982	2006
Bluegill	3.0-5.5 in	249	272	447
	6.0-6.5 in	17	74	120
	7.0-7.5 in	10	54	52
	≥ 8.0 in	3	13	9
Largemouth bass	8.0-9.5 in	16	21	15
	10.0-11.5 in	13	5	14
	12.0-13.5 in	3	4	17
	14.0-17.5 in	2	2	13
	≥ 18.0 in	0	3	3
Redear	3.0-5.5 in	109	10	24
	6.0-7.5 in	50	147	127
	8.0-9.5 in	16	61	197
	≥ 10.0 in	1	3	3

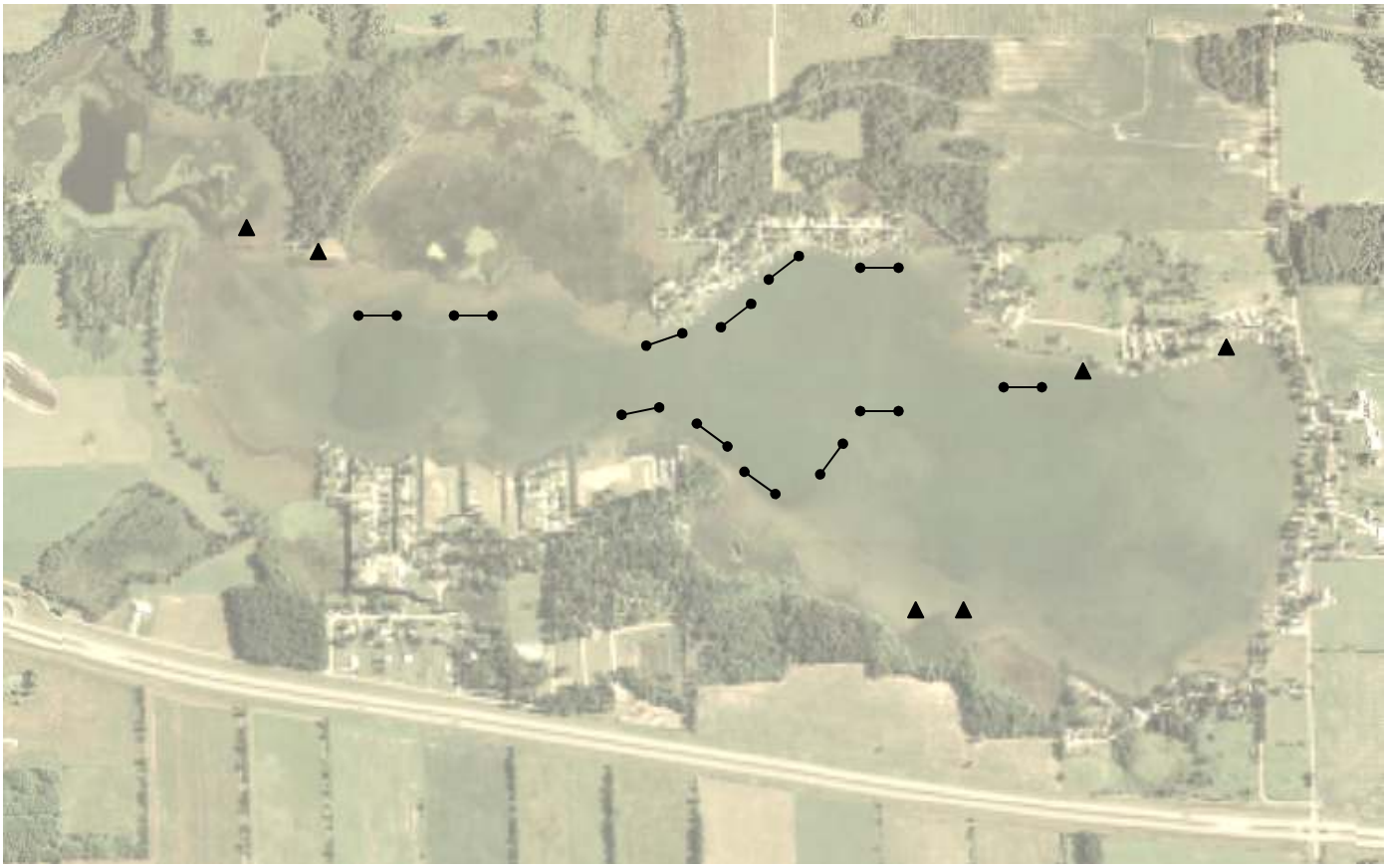

Figure 1. Aerial photo of Lake Pleasant with sample locations.

APPENDIX 1. Survey data pages.

LAKE SURVEY REPORT

Type of Survey: [ ] Initial Survey [X] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
Lake Pleasant	Steuben	June 12-16, 2006
Biologist's name		Date of approval (Month, day, year)
Neil D. Ledet and Larry A. Koza		

LOCATION

Quadrangle Name	Range	Section
Kinderhook, Mich-In.	R12E, R13E, R7W	11,12,13,14,18
Township Name	Nearest Town	
T38N, T8S	Orland, Indiana	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
None	Southwest shore at marina.	South shore at campground.

Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
424	52 ft.	8.2 ft.	3,489	960.90 ft.	

Location of benchmark: None established

INLETS

Name	Location	Origin
Unnamed	Northeast	Intermittent ditch

OUTLETS

Name	Location
Unnamed	North shore, flows north to Prairie River in Michigan

Water level control

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM		
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL		
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

- [ ] Boulder
- [ ] Gravel
- [X] Sand
- [ ] Muck
- [ ] Clay
- [X] Marl

Watershed use: General farming - row crops.

Development of shoreline: 50% residential - limited to the east shore, middle of north shore, and southwest shore.

Previous surveys and investigations: Hydrographic survey (U.S.G.S., 1960). Investigations of Indiana Lakes (Scott 1931).

Fisheries survey: McGinity, 1965; Ledet, 1982.

SAMPLING EFFORT					
ELECTROFISHING	Day hours: 0		Night hours: 1.25		Total hours: 1.25
TRAP NETS	Number of traps: 2		Number of Lifts: 3		Total effort: 6
GILL NETS	Number of nets: 3		Number of Lifts: 4		Total effort: 12
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color: Light Green	Turbidity: 19 Feet 0 Inches (SECCHI DISK)
Alkalinity (ppm)*: Surface: 171.6 Bottom: 171.6	pH: Surface: 9.2 Bottom: 9.0
Conductivity: 410 micromhos	Air temperature: °F
Water chemistry GPS coordinates: N 41.75723	W 85.09000

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	71.6	8.7	36	56.8	2.1	72		
2	71.6	8.6	38	55.8	1.5	74		
4	71.6	8.6	40	55.4	0.9	76		
6	71.6	8.6	42	55.0	0.6	78		
8	71.6	8.6	44	54.5	0.3	80		
10	71.4	8.6	46	54.5	0.3	82		
12	70.0	8.5	48	54.5	0.3	84		
14	69.8	8.4	50	54.5	0.3	86		
16	68.0	8.4	52			88		
18	64.8	8.0	54			90		
20	62.8	7.8	56			92		
22	61.7	7.7	58			94		
24	60.8	7.2	60			96		
26	60.4	6.4	62			98		
28	59.2	5.7	64			100		
30	59.0	49.0	66					
32	58.3	3.7	68					
34	57.6	2.6	70					

COMMENTS

*ppm-parts per million

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Bluegill	678	46.6	1.8 - 8.6	64.61	11.9
Redear	351	24.1	3.7 - 11.3	119.30	21.9
Largemouth bass	87	6.0	3.3 - 18.4	64.31	11.8
Northern pike	61	4.2	14.1 - 33.5	157.75	29.0
Yellow bullhead	53	3.6	5.9 - 13.4	31.85	5.9
Warmouth	48	3.3	2.9 - 7.4	3.68	0.7
Yellow perch	42	2.9	4.6 - 8.4	3.93	0.7
Pumpkinseed	26	1.8	2.7 - 7.1	2.70	0.5
Black crappie	23	1.6	4.7 - 12.0	6.34	1.2
Brown bullhead	20	1.4	8.7 - 14.8	18.43	3.4
Rock bass	17	1.2	3.3 - 7.9	2.63	0.5
Hybrid sunfish	15	1.0	3.8 - 8.6	3.22	0.6
Bowfin	8	0.6	17.3 - 23.6	21.88	4.0
Longnose gar	8	0.6	30.5 - 44.0	34.75	6.4
Grass pickerel	5	0.3	6.3 - 11.3	0.79	0.1
Spotted gar	4	0.3	19.7 - 25.7	5.84	1.1
Golden shiner	3	0.2	5.1 - 5.5	0.15	**
Green sunfish	2	0.1	2.6 - 3.2	0.04	**
Lake chubsucker	2	0.1	3.2 - 7.1	0.18	**
Smallmouth bass	1	0.1	15.2	1.49	0.3
Brook silverside	Common				
Total (21 Species)	1,454			543.86	

*Common names of fishes recognized by the American Fisheries Society.

**Less than 0.1 percent

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLUEGILL									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0	17	2.5	0.01	1	20.0				
2.5	33	4.9	0.01	1	20.5				
3.0	27	4.0	0.02	2,3	21.0				
3.5	70	10.3	0.03	2,3	21.5				
4.0	59	8.7	0.04	3,4	22.0				
4.5	91	13.4	0.05	3,4	22.5				
5.0	113	16.7	0.12	3,4	23.0				
5.5	87	12.8	0.11	4,5	23.5				
6.0	56	8.3	0.17	5,6,7	24.0				
6.5	64	9.4	0.20	5,6,7	24.5				
7.0	31	4.6	0.26	5,6,7	25.0				
7.5	21	3.1	0.32	5,6,7	25.5				
8.0	7	1.0	0.40	5,6,7	26.0				
8.5	2	0.3	0.52	7,8	TOTAL	678			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	406.4/hr	GILL NET CATCH	2.3/lift	TRAP NET CATCH	23.7/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF REDEAR									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5	1	0.3	0.03	2	21.5				
4.0					22.0				
4.5	4	1.1	0.06	3	22.5				
5.0	7	2.0	0.08	3	23.0				
5.5	12	3.4	0.14	3,4	23.5				
6.0	20	5.7	0.16	3,4	24.0				
6.5	33	9.4	0.23	3,4	24.5				
7.0	26	7.4	0.27	3,4	25.0				
7.5	48	13.7	0.38	4,5	25.5				
8.0	72	20.5	0.45	4,5	26.0				
8.5	67	19.1	0.56	4,5	TOTAL	351			
9.0	41	11.7	0.63	4,5					
9.5	17	4.8	0.75	4,5					
10.0									
10.5	1	0.3	0.82	4					
11.0	1	0.3	1.19	5					
11.5	1	0.3	1.09	6					
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	33.6/hr	GILL NET CATCH	0.5/lift	TRAP NET CATCH	50.5/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5	1	1.1	0.02	1	21.5				
4.0	6	6.9	0.03	1	22.0				
4.5					22.5				
5.0					23.0				
5.5	2	2.3	0.08	1,2	23.5				
6.0	1	1.1	0.10	2	24.0				
6.5	4	4.6	0.14	2,3	24.5				
7.0	5	5.7	0.16	2,3	25.0				
7.5	6	6.9	0.20	3,4	25.5				
8.0	3	3.4	0.23	3,4	26.0				
8.5	2	2.3	0.28	3,4	TOTAL	87			
9.0	3	3.4	0.35	3,4					
9.5	7	8.0	0.38	3,4					
10.0	5	5.7	0.46	3,4,5					
10.5	1	1.1	0.57	4					
11.0	4	4.6	0.62	4,5					
11.5	4	4.6	0.75	5					
12.0	5	5.7	0.89	3,4,5,6					
12.5	3	3.4	0.91	5,6					
13.0	1	1.1	1.36	6					
13.5	8	9.2	1.36	6,7					
14.0	3	3.4	1.56	7					
14.5	3	3.4	1.42	7					
15.0	1	1.1	1.57	8					
15.5	1	1.1	1.73	6					
16.0									
16.5	1	1.1	2.09	7					
17.0	3	3.4	3.10	8,9					
17.5	1	1.1	2.50	8					
18.0	2	2.3	3.10	9,10					
18.5	1	1.1	2.95	8					

ELECTROFISHING CATCH	49.6/hr	GILL NET CATCH	1.8/lift	TRAP NET CATCH	0.5/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF NORTHERN PIKE									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0	3	4.9	1.46	1,2
1.5					19.5	2	3.3	1.59	1,2
2.0					20.0	5	8.2	1.59	2
2.5					20.5	4	6.6	1.85	2
3.0					21.0	2	3.3	2.03	2,4
3.5					21.5	4	6.6	2.07	2,3
4.0					22.0	1	1.6	2.12	3
4.5					22.5	6	9.8	2.9.	3,4,5
5.0					23.0	8	13.1	2.92	2,3,4
5.5					23.5	2	3.3	2.82	4,5
6.0					24.0	2	3.3	2.95	3,4
6.5					24.5	1	1.6	3.21	4
7.0					25.0	2	3.3	3.42	3,5
7.5					25.5	1	1.6	3.64	4
8.0					26.0	1	1.6	4.10	5
8.5					26.5				
9.0					27.0				
9.5					27.5	1	1.6	4.34	6
10.0					28.0	1	1.6	4.59	5
10.5					28.5	1	1.6	4.86	5
11.0					29.0	1	1.6	5.15	5
11.5					29.5				
12.0					30.0				
12.5					30.5	1	1.6	6.33	7
13.0					31.0				
13.5					31.5				
14.0	1	1.6	0.57	1	32.0	1	1.6	7.34	6
14.5					32.5				
15.0					33.0				
15.5					33.5	1	1.6	8.46	7
16.0					TOTAL	61			
16.5									
17.0	3	4.9	1.04	1,2					
17.5	1	1.6	1.13	2					
18.0	3	4.9	1.18	2					
18.5	2	3.3	1.35	2					

ELECTROFISHING CATCH	0/hr	GILL NET CATCH	5.1/lift	TRAP NET CATCH	0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF YELLOW PERCH									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5	1	2.4	0.04	2	22.5				
5.0	6	14.3	0.06	1,2	23.0				
5.5	9	21.4	0.09	2	23.5				
6.0	10	23.8	0.09	2	24.0				
6.5	10	23.8	0.11	2,3	24.5				
7.0					25.0				
7.5	3	7.1	0.20	2,3	25.5				
8.0	2	4.8	0.23	4	26.0				
8.5	1	2.4	0.27	3	TOTAL	42			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	28/hr	GILL NET CATCH	0.6/lift	TRAP NET CATCH	0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLACK CRAPPIE									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5	1	4.3	0.04	2	22.5				
5.0					23.0				
5.5	3	13.0	0.08	2	23.5				
6.0	1	4.3	0.10	2	24.0				
6.5	1	4.3	0.13	2	24.5				
7.0					25.0				
7.5	2	8.7	0.22	3,4	25.5				
8.0	5	21.7	0.26	4	26.0				
8.5	6	26.1	0.36	4,5	TOTAL	23			
9.0	1	4.3	0.42	4					
9.5	1	4.3	0.49	5					
10.0									
10.5									
11.0	1	4.3	0.67	6					
11.5									
12.0	1	4.3	0.87	7					
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	0.8/hr	GILL NET CATCH	1.6/lift	TRAP NET CATCH	0.5/lift

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Bluegill				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.8	2005	4	2.2 - 2.7	2.2							
	2004	5	2.8 - 3.4	1.6	2.5						
	2003	12	3.2 - 5.1	1.5	2.4	3.5					
	2002	11	3.9 - 5.5	1.6	2.3	3.1	4.1				
	2001	9	5.6 - 7.8	1.5	2.4	3.6	4.6	5.8			
	2000	6	6.0 - 7.9	1.4	2.1	3.0	4.1	5.3	6.3		
	1999	12	5.9 - 8.3	1.4	2.0	2.9	3.7	5.0	6.1	7.0	
	AVERAGE LENGTH			1.6	2.3	3.2	4.1	5.4	6.2	7.0	
	NUMBER AGED			59	55	50	38	27	18	12	

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Redear				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.6											
	2004	1	3.7	1.4	3.1						
	2003	18	4.1 - 6.9	1.4	2.9	4.8					
	2002	32	5.3 - 10.5	1.8	3.7	5.7	7.4				
	2001	4	7.3 - 10.9	2.0	4.3	6.0	7.0	8.4			
	AVERAGE LENGTH			1.8	3.6	5.5	7.2	8.4			
	NUMBER AGED			55	55	54	36	4			

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Largemouth bass				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.8	2005	4	3.3 - 5.4	3.3							
	2004	8	5.7 - 7.0	2.8	5.3						
	2003	13	6.7 - 12.1	2.6	5.2	7.9					
	2002	18	7.4 - 11.9	2.8	4.6	7.0	9.1				
	2001	7	11.1- 12.7	2.8	4.9	7.7	9.7	11.3			
	2000	10	12.0 - 15.3	3.0	5.5	8.2	10.5	12.0	13.0		
	1999	8	13.7 - 16.8	2.6	4.8	7.7	10.1	11.7	13.4	14.3	
	1998	3	15.1 - 18.4	3.0	5.4	7.7	10.0	12.5	14.3	15.7	16.6
	AVERAGE LENGTH			2.9	5.1	7.7	9.9	11.9	13.6	15.0	16.6
	NUMBER AGED			71	67	59	46	28	21	11	3

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Northern pike				I	II	III	IV	V	VI	VII	VIII
Intercept = 2.1	2005	5	14.1 - 19.6	14.3							
	2004	19	16.8 - 23.1	13.5	17.8						
	2003	10	21.5 - 24.8	13.4	18.5	21.2					
	2002	9	21.2 - 25.5	13.6	18.5	21.2	22.5				
	2001	7	22.3 - 29.2	12.8	18.8	21.7	23.7	25.1			
	2000	2	27.4 - 31.8	14.9	20.2	23.2	24.9	26.8	28.6		
	1999	1	30.5	12.4	21.3	24.3	25.7	27.0	28.4	29.6	
	AVERAGE LENGTH			13.5	18.4	21.3	23.1	25.1			
	NUMBER AGED			53	48	29	19	10	3	1	

*Not included in average length calculations.

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Yellow perch				I	II	III	IV	V	VI	VII	VIII
Intercept = 1.2	2005	2	4.8 - 5.0	3.5							
	2004	17	4.6 - 7.6	3.0	4.8						
	2003	5	6.3 - 8.4	3.3	5.0	6.3					
	2002	2	8.0 - 8.2	2.8	4.4	6.3	7.5				
	AVERAGE LENGTH			3.2	4.9	6.3					
	NUMBER AGED			26	24	7	2				

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Black crappie				I	II	III	IV	V	VI	VII	VIII
Intercept = 1.4											
	2004	3	4.7 - 6.0	2.7	4.6						
	2003	2	6.4 - 7.5	2.1	3.8	6.0					
	2002	7	7.6 - 9.0	2.2	3.6	5.4	7.3				
	2001	3	8.5 - 9.5	2.3	3.0	5.9	7.5	8.3			
	AVERAGE LENGTH			2.4	4.0	5.7	7.4	8.3			
	NUMBER AGED			15	15	12	10	3			

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
				I	II	III	IV	V	VI	VII	VIII
Intercept =											
	AVERAGE LENGTH										
	NUMBER AGED										

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
				I	II	III	IV	V	VI	VII	VIII
Intercept =											
	AVERAGE LENGTH										
	NUMBER AGED										

*Not included in average length calculations.

GILL NETS					TRAP NETS					ELECTROFISHING				
1	N	41.75876	W	85.08794	1	N	41.75951	W	85.10439	1	N		W	
	N		W		2	N	41.75700	W	85.08295		N		W	
2	N	41.75546	W	85.09282	3	N	41.76028	W	85.10626	2	N		W	
	N		W		4	N	41.75714	W	85.07956		N		W	
3	N	41.75814	W	85.10219	5	N	41.75199	W	85.08688	3	N		W	
	N		W		6	N	41.75217	W	85.08769		N		W	
4	N	41.75749	W	85.09488	7	N		W		4	N		W	
	N		W		8	N		W			N		W	
5	N	41.75484	W	85.09166	9	N		W		5	N		W	
	N		W		10	N		W			N		W	
6	N	41.75807	W	85.10101	11	N		W		6	N		W	
	N		W		12	N		W			N		W	
7	N	41.75486	W	85.09085	13	N		W		7	N		W	
	N		W		14	N		W			N		W	
8	N	41.75905	W	85.09115	15	N		W		8	N		W	
	N		W		16	N		W			N		W	
9	N	41.75603	W	85.09362	17	N		W		9	N		W	
	N		W		18	N		W			N		W	
10	N	41.75866	W	85.09217	19	N		W		10	N		W	
	N		W		20	N		W			N		W	
11	N	41.75644	W	85.09045						11	N		W	
	N		W								N		W	
12	N	41.75656	W	85.08582						12	N		W	
	N		W								N		W	
13	N		W							13	N		W	
	N		W								N		W	
14	N		W							14	N		W	
	N		W								N		W	
15	N		W							15	N		W	
	N		W								N		W	
16	N		W							16	N		W	
	N		W								N		W	
17	N		W							17	N		W	
	N		W								N		W	
18	N		W							18	N		W	
	N		W								N		W	
19	N		W							19	N		W	
	N		W								N		W	
20	N		W							20	N		W	
	N		W								N		W	

Occurrence and Abundance of Submersed Aquatic Plants

Date:	8/15/06	Littoral sites with plants:	72	Species diversity:	0.82
Littoral depth (ft):	18.0	Number of species:	15	Native diversity:	0.82
Littoral sites:	77	Maximum species/site:	6	Rake diversity:	0.78
Total sites:	80	Mean number species/site:	2.38	Native rake diversity:	0.78
Secchi:	7.5	Mean native species/site:	2.36	*Mean rake score:	0.48

Common Name	Site frequency	Relative density	Mean density	Dominance
Bladderwort	19.5	0.25	1.27	4.9
Chara	79.2	1.45	1.84	29.1
Coontail	2.6	0.08	3.00	1.6
Curly-leaf Pondweed	1.3	0.01	1.00	0.3
Eel Grass	18.2	0.22	1.21	4.4
Flat-stemmed Pondweed	1.3	0.01	1.00	0.3
Illinois Pondweed	19.5	0.26	1.33	5.2
Nitella	2.6	0.03	1.00	0.5
Variable Pondweed	19.5	0.29	1.47	5.7
Richardson's Pondweed	3.9	0.06	1.67	1.3
Small Pondweed	1.3	0.01	1.00	0.3
Sago Pondweed	1.3	0.01	1.00	0.3
Spiny Naiad	22.1	0.39	1.76	7.8
Water Stargrass	1.3	0.01	1.00	0.3
Slender Naiad	40.3	0.47	1.16	9.4

Other Observed Plants

Arrowhead, Hardstem bulrush, Pickerelweed, Spatterdock, White waterlily, Purple loosestrife and Cattail.